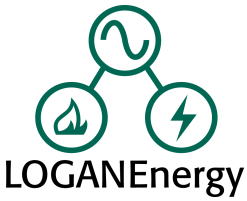

DACA42-03-C-0024
LOGANEnergy Corp.

Ft Belvoir, VA PEM Demonstration Project
Initial Project Report

Proton Exchange Membrane (PEM) Fuel Cell Demonstration
Of Domestically Produced PEM Fuel Cells in Military Facilities

US Army Corps of Engineers
Engineer Research and Development Center
Construction Engineering Research Laboratory
Broad Agency Announcement CERL-BAA-FY02

Ft Belvoir, VA Fire Station

10 Nov 2004

Executive Summary

Under terms of its FY'02 DOD PEM Demonstration Contract with ERDC/CERL, LOGANEnergy will install and demonstrate a Plug Power GenSys 5kWe Combined Heat and Power fuel cell power plant for one year at the South Post Fire Station, Ft Belvoir Army Base, VA, near Washington, DC. This project is one of two Ft Belvoir sites originally awarded to LOGAN, however the second site encountered frustrations due to personnel changes on the base, which has caused LOGAN to seek opportunity elsewhere.

The South Post Fire Station unit will be electrically configured to provide grid parallel/grid independent service to the facility and it will also be thermally integrated with its gas-fired water to support domestic thermal loads. Local electrical and mechanical contractors may be hired as necessary to provide services needed to support the installation tasks. It is anticipated that the project will add $619.00 in annual energy costs to Ft Belvoir during the period of performance.

Patrick McLaughlin, Chief, Environmental & Natural Resource Division is the Fort Belvoir POC. He may be reached at:

Phone - 703-806-3193

E-Mail - patrick_m_mclaughlin@belvoir.army.mil

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Proposal – Proton Exchange Membrane (PEM) Fuel Cell Demonstration of Domestically Produced Residential PEM Fuel Cells in Military Facilities

1.0 Descriptive Title

LOGANEnergy Corp. Small Scale PEM 2004 Demonstration Project at Ft Belvoir, VA

2.0 Name, Address and Related Company Information

LOGANEnergy Corporation

1080 Holcomb Bridge Road
BLDG 100- 175
Roswell, GA 30076
(770) 650- 6388

DUNS 01-562-6211
CAGE Code 09QC3
TIN 58-2292769

LOGANEnergy Corporation is a private Fuel Cell Energy Services company founded in 1994. LOGAN specializes in planning, developing, and maintaining fuel cell projects. In addition, the company works closely with manufacturers to implement their product commercialization strategies. Over the past decade, LOGAN has analyzed hundreds of fuel cell applications. The company has acquired technical skills and expertise by designing, installing and operating over 30 commercial and small-scale fuel cell projects totaling over 7 megawatts of power. These services have been provided to the Department of Defense, fuel cell manufacturers, utilities, and other commercial customers. Presently, LOGAN supports 30 PAFC and PEM fuel cell projects at 21 locations in 12 states, and has agreements to install 22 new projects in the US and the UK over the next 18 months.

3.0 Production Capability of the Manufacturer

Plug Power manufactures a line of PEM fuel cell products at its production facility in Latham, NY. The facility produces three lines of PEM products including the 5kW GenSys5C natural gas unit, the GenSys5P LP Gas unit, and the GenCor 5kW standby power system. The current facility has the capability of manufacturing 10,000 units annually. Plug will support this project by providing remote monitoring, telephonic field support, overnight parts supply, and customer support. These services are intended to enhance the reliability and performance of the unit and achieve the highest possible customer satisfaction. Scott Wilshire is the Plug Power point of contact for this project. His phone number is 518.782.7700 ex1338, and his email address is scott_wilshire@plugpower.com.

4.0 Principal Investigator(s)

Name	Samuel Logan, Jr.	Chris Davis
Title	President	Vice President Operations
Company	Logan Energy Corp.	Logan Energy Corp.
Phone	770.650.6388 x 101	(860) 872-1120
Fax	770.650.7317	770.650.7317
Email	samlogan@loganenergy.com	cdavis@loganenergy.com

5.0 Authorized Negotiator(s)

Name	Samuel Logan, Jr.	Chris Davis
Title	President	Vice President Operations
Company	Logan Energy Corp.	Logan Energy Corp.
Phone	770.650.6388 x 101	(860) 872-1120
Fax	770.650.7317	770.650.7317
Email	samlogan@loganenergy.com	cdavis@loganenergy.com

6.0 Past Relevant Performance Information

a) Contract: PC25 Fuel Cell Service and Maintenance Contract #X1237022

Merck & Company
Ms. Stephanie Chapman
Merck & Company
Bldg 53 Northside
Linden Ave. Gate
Linden, NJ 07036
(732) 594-1686

Four-year PC25 PM Services Maintenance Agreement.
In November 2002 Merck & Company issued a four-year contract to LOGAN to provide fuel cell service, maintenance and operational support for one PC25C fuel cell installed at their Rahway, NJ plant. During the contract period the power plant has operated at 94% availability.

b) Contract: Plug Power Service and Maintenance Agreement to support one 5kWe GenSys 5C and one 5kWe GenSys 5P PEM power plant at NAS Patuxant River, MD. .

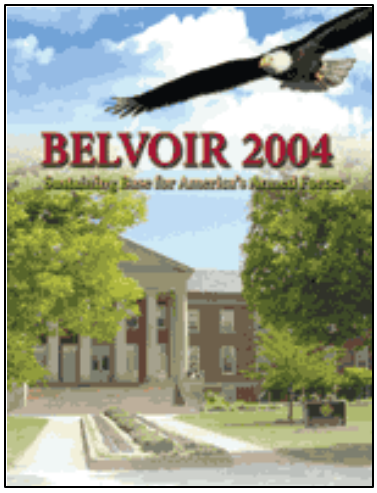
Plug Power
Mr. Scott Wilshire.
968 Albany Shaker Rd.
Latham, NY 12110
(518) 782-7700 ex 1338

c) Contract: A Partners LLC Commercial Fuel Cell Project Design, Installation and 5-year service and maintenance agreement on 600kW UTC PC25 power block.

Contract # A Partners LLC, 12/31/01

Mr. Ron Allison
A Partner LLC
1171 Fulton Mall
Fresno, CA 93721
(559) 233-3262

6.0 Host Facility Information



Historic Fort Belvoir is a beautiful installation, with a unique and complex history. At first glance it may appear to be a typical US military post, but closer inspection reveals a thoroughly modern American city with new and improved roads and buildings, with a growing number of organizations that call Fort Belvoir "home," more civilian employees, and far fewer soldiers-in-training than at any other time in our proud history.

However, Ft Belvoir's military mission is global. As a strategic sustaining base for America's Army, the work we do is vital to the success of the goals and objectives of the nation's defense strategy.

A list of the nearly 100 tenant organizations that call Fort Belvoir home reads like a "Who's Who" of the Department of Defense. No other Army installation in the world can compare to Fort Belvoir and its singular mission to provide both logistical and administrative support to such a diverse mix of tenant and satellite organizations.

Fort Belvoir is home to one Army major command headquarters and elements of 10 others; 19 different agencies and direct reporting units of the Department of Army; eight elements of the U.S. Army Reserve and the Army National Guard; and 26 DoD agencies. Also located here are a Marine Corps detachment, a U.S. Air Force activity, and an agency from the Department of the Treasury.

8.0 Fuel Cell Site Information

Pictured at left is the front elevation of the Ft. Belvoir Fire Station (South Post) building 191, the site for this PEM demonstration project. Because the building is listed on the national historic registry, the project was delayed nearly four months in order to gain approval from the base architect. However, on September 17, 2004, the project moved forward as a site evaluation team consisting of Bill Taylor representing CERL, Mike Harvell and Keith Spitznagel of LOGAN and several representatives of Ft Belvoir DPW together with the station fire chief toured the fire station. Following that, the team agreed that the site would serve the demonstration very well.

The photo at left shows the fuel cell pad site, supporting an inoperative air conditioning compressor, as it appeared during the site evaluation. The photo below shows the Plug Power GenSys5C (See appendix section 2 for specifications) fuel cell situated on the same pad after removing the compressor unit. The same photo also shows the natural gas meter serving the building, which will provide the fuel supply to the fuel cell. The building does not currently have high speed Ethernet service, but the project POC has offered assistance to acquire the service.

9.0 Electrical System

The Plug Power GenSys 5C PEM fuel cell power plant provides both gird parallel and grid independent operating configurations for site power management. This capability is an important milestone in the development of the GenSys5 as it approaches product commercialization. The unit has a power output of 110/120 VAC at 60 Hz, and when necessary the voltage can be adjusted to 208vac or 220vac depending upon actual site conditions. At this site the unit will be connected to the facility in a grid parallel/grid independent configuration dispatching power at 2.5 kW for most of the period of performance. The photo at left shows a new fuel cell electrical interconnect configuration that LOGAN will be testing for the first time at this site. Note the new base plate and bracket that attaches the wattmeter and service disconnect directly to the fuel cell. This improvement makes for a more cost effective installation and simplifies service and maintenance of the unit.

The fuel cell will be configured to operate in both a grid parallel/grid independent electrical configuration and connect to the building main panel located on the interior wall directly behind the unit. There the fuel cell will be electrically coupled to the base utility grid at a spare 50-amp circuit breaker cubicle. A separate emergency panel will be installed adjacent to this service panel to provide stand-by power for several non-critical loads in the event of a grid failure during the test period. This will provide the opportunity to demonstrate the fuel cell's grid independent capability.

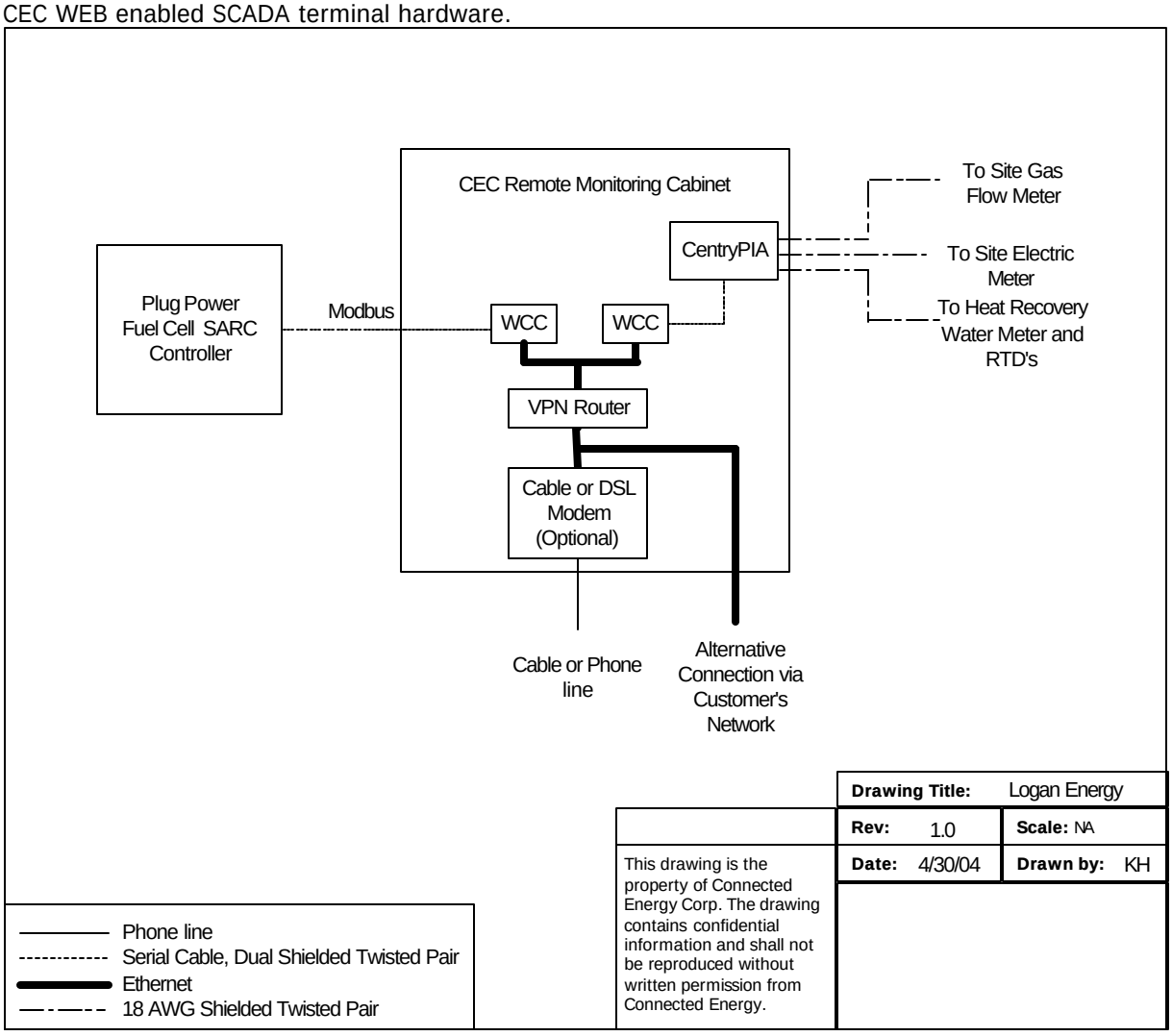
10.0 Thermal Recovery System

LOGAN will install a Heliodyne heat exchanger to capture fuelcell waste heat and transfer it into the fire station's hot water heater in a manner similar to the New Orleans Coast Guard installation pictured at right. (Note the heat exchanger attached to the hot water heater) The Heliodyne is a looped coil within a coil design that provides double wall protection between the heat source and the heat sink. It was designed primarily for the solar heating industry, but has proved to be very adaptable to the fuel cell industry, as LOGAN has used this product to good effect at several other PEM demonstration sites. At Ft Belvoir fire station, the Heliodyne will mount either directly to the storage tank or on an adjacent wall. It has its own pump that circulates the storage tank in a counter flow against incoming hot water provided by a thermal loop connected to the fuel cell's heat exchanger. While operating at a set point of 2.5 kWh, the fuel cell has a heat rate of approximately 33,000 Btuh and would provide 7800 Btuh through the Heliodyne to the hot water tank.

11.0 Data Acquisition System

LOGAN proposes to install a Connected Energy Corporation web based SCADA system that provides high-speed access to real time monitoring of the power plant. The schematic drawing seen below describes the architecture of the CEC hardware that will support the project. The system provides a comprehensive data acquisition solution and also incorporates remote control, alarming, notification, and reporting functions. The system will pick up and display a number of fuel cell operating parameters on functional display screens including kWH, cell stack voltage, and water management, as well as external instrumentation inputs including Btus, fuel flow, and thermal loop temperatures. CEC's Operations Control Center in Rochester, New York maintains connectivity by means of a Virtual Private Network that will link the fuel cell to the center.

CEC WEB enabled SCADA terminal hardware.



LOGAN will procure high-speed Internet access to the fuel cell router from a local DSL or cable service provider. The base will provide local dial tone to a phone jack that will be conveniently located in the electric closet of building 191 to provide communications with the fuel cell data modem.

12.0 Economic Analysis

Ft Belvoir, VA

Project Utility Rates					
1) Water (per 1,000 gallons)	$ 0.45				
2) Utility (per KWH)	$ 0.05				
3) Natural Gas (per MCF)	$ 7.25				
First Cost			**Estimated**	**Actual**	
Plug Power 5 kW SU-1			$ 65,000.00		
Shipping			$ 2,800.00		
Installation electrical			$ 2,275.00		
Installation mechanical & thermal			$ 6,215.00		
Metering, Instrumentation, Web Package			$ 11,830.00		
Site Prep, labor materials			$ 1,775.00		
Technical Supervision/Start-up			$ 4,000.00		
Total			**$ 93,895.00**		
Assume Five Year Simple Payback			$ 18,779.00	$ -	
Forcast Operating Expenses	Volume	$/Hr	$/ Yr		
Natural Gas Mcf/ hr @ 2.5kW	0.0330	$ 0.24	$ 1,886.25		
Water Gallons per Year	14,016		$ 6.31		
Total Annual Operating Cost				$ 1,892.55	
Economic Summary					
Forcast Annual kWH		19710			
Annual Cost of Operating Power Plant		$ 0.096	kWH		
Credit Annual Thermal Recovery Rate		($0.012)	kWH		
Project Net Operating Cost		$ 0.084	kWH		
Displaced Utility cost		$ 0.053	kWH		
Energy Savings (Cost)		($0.031)	kWH		
Annual Energy Savings (Cost)		($618.94)			

13.0 Kickoff Meeting Information

The project kick-off meeting occurred September 17, 2004 at Ft Belvoir. A that time Bill Taylor representing CERL, Mike Harvell and Keith Spitznagel representing LOGANEnergy were joined by the following Ft Belvoir representatives:
Randy Smidt (SpecPro Inc. – DPW Contractor) – 703.806.0023
Mike Smith (DPW Utilities) – 703.806.3765
J.W. McGhee (DES Fire Department) – 703.805.2091
Nicholas Sifer (US Army RDECOM) – 703.704.0272
During the meeting CERL and LOGAN presented the purpose and scope of the PEM demonstration project and the installation plan to Ft Belvoir. During the discussion that followed, the parties reached general consensus and determined that the project was ready to proceed.

14.0 Status/Timeline

See Appendix Section 4.

Appendix

Section 1.
Sample form used to qualify the fuel cell for initial start and the project acceptance test.

Installation/Acceptance Test Report

Site: Ft Belvoir, VA

Installation Check List

TASK	Initials	DATE	TIME (hrs)
Batteries Installed	MH		
Stack Installed	MH		
Stack Coolant Installed	MH		
Air Purged from Stack Coolant	MH		
Radiator Coolant Installed	MH		
Air Purged from Radiator Coolant	MH		
J3 Cable Installed	MH		
J3 Cable Wiring Tested	MH		
Inverter Power Cable Installed	MH		
Inverter Power Polarity Correct	MH		
RS 232 /Modem Cable Installed	MH		
DI Solenoid Cable Installed with Diode	MH		
Natural Gas Pipe Installed	MH		
DI Water / Heat Trace Installed	MH		
Drain Tubing Installed	MH		

Commissioning Check List and Acceptance Test

TASK	Initials	DATE	TIME (hrs)
Controls Powered Up and Communication OK	MH		
SARC Name Correct	MH		
Start-Up Initiated	MH		
Coolant Leak Checked	MH		
Flammable Gas Leak Checked	MH		
Data Logging to Central Computer	MH		
System Run for 8 Hours with No Failures	MH		

Section 2

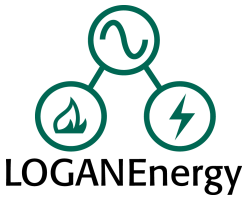
Plug Power GenSys5C Specifications


Plug Power GenSys 5C

- Dimensions 84 1/2" x 32" x 68 1/4"

- Performance Continuous Power Rating 5kWe (9kWth)
  Power Output 2.5-5kWe (3-9kWth)
  Voltage 120/240 VAC @ 60Hz
  Power Quality IEEE 519, Grid Interconnect IEEE P1547
  Emissions NOX <1ppm...SOX <1ppm
- Noise <60 dBa @ 1 meter
- Operating Conditions Temperature 0°F to 104°F
- Elevation 0 to 6000 feet
- Installation Outdoor
- Electrical Connection, Grid Parallel/Grid Independent
- Fuel, Natural Gas
- Certifications Power Generation, CSA International
- Power Conditioning UL 1741— Electromagnetic Compliance FCC Class B —

Section 3



DOD FUEL CELL PROJECT KICKOFF MEETING AGENDA

Date:

Location:

ATTENDEES	ORG.	PHONE	CELL	EMAIL

Status

1. Introduction, Initial Project Report, design/review installation plan: OK OPEN

2. Discuss project objectives and core requirements: OK OPEN

3. Discuss project/fuel cell communication requirements: OK OPEN

4. Environmental, base access and other security issues: OK OPEN

5. Unresolved issues...POC approval: OK OPEN

Ft Belvoir,VA PEM Fuel Cell Demonstration Project

Installation, Monitoring, Performance Evaluations, & Reporting on One Plug Power PEM Fuel Cell At Ft Belvoir South Post Fire Station

Column Headings Indicate the Beginning of Each Month

nstallation Schedule